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REPORT NO. 89-R-06
AFPEA PROJECT NO. 88-P-102

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QUALIFICATION TESTING OF THE COMBAT TALON II RECEIVER/TRANSMITTER CONTAINER

HQ AFLC/DSTZ
AIR FORCE PACKAGING EVALUATION ACTIVITY
Wright-Patterson AFB OH 45433-5999

August 1989

ABSTRACT

Aeronautical Systems Division, ASD/VXAL, requested assistance from the Air Force Packaging Evaluation Activity (AFPEA) to choose an off the shelf container and qualify it for the receiver/transmitter (R/T) used on Combat Talon II aircraft.

The R/T prototype container was tested at the AFPEA, HQ AFLC/DSTZ, Wright-Patterson AFB, OH 45433-5999. The container is environmentally sealed and outfitted with a humidity indicator and pressure relief valve. The container is designed to protect one R/T during worldwide shipment, storage, and handling.

The container test plan was developed to test the fragility and environmental sealing qualification requirements. The tests were conducted in accordance with Federal Test Method Standard No. 101, and Military Standard 648.

Results of the tests conducted on the prototype container show that the container provides adequate mechanical protection but only marginal environmental protection. Based on the projected operational environment, the system program office has elected to use the container.

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INTRODUCTION

BACKGROUND: Aeronautical Systems Division (ASD/VXAL), Wright-Patterson AFB OH 45433-5000 requested assistance from the Air Force Packaging Evaluation Activity (AFPEA) to choose an off the shelf container for the ku-band and x-band receiver transmitters (R/T) and perform qualification testing. Since the two R/T's are identical only one container design is necessary. The container chosen was a plastic multipurpose container designed by Hardigg Industries, South Deerfield, MA 01373.

PURPOSE: The purpose of this project was to determine if the container design will protect the contents, one R/T for Combat Talon II aircraft, during worldwide shipment, storage, and handling.

DESCRIPTION OF TEST CONTAINER

The 11214-8678-100 prototype container, now referred to as -100, was subjected to extensive testing. The sides, edges and latches of the container were numbered counterclockwise from the forward end as shown in figure 1.

Design: The -100 prototype is a controlled-breathing container (see figure 2), with a pressure relief valve and humidity indicator. The container is designed to limit the transmission of shocks to the R/T to 40 Gs. Fourteen wing latches allow quick access to the container contents without the use of tools.

Construction: The container is rotationally molded from a formulation of polyethylene. Two pound density polyethylene foam encapsulates the item (see figure 3). A silicone gasket provides a seal between the container base and the container cover.

TEST OUTLINE AND TEST EQUIPMENT

Test Plan: Tests were conducted in accordance with AFPEA Test Plan 88-P-102 (see table 1). The tests used were selected to meet the qualification requirements for fragility and environmental sealing. Test methods, procedures and pass/fail criteria used were as outlined in Federal Test Method Standard No. 101 (FED-STD-101) and Military Standard 648. Any modifications to the standard procedures are noted in the test plan or the results.

Test Load: All tests were conducted using the R/T test load fabricated at the AFPEA. The test load weighs 145 pounds and simulates the center of gravity and the mass moment of inertia of an actual R/T.

Test Site: All testing was conducted at the AFPEA, HQ AFLC/DSTZ, Building 70, Area C, Wright-Patterson AFB OH 45433-5999. The equipment required for each test is noted in the test plan.

TEST PROCEDURES AND RESULTS

Weight Test

Test No. 1: The container was weighed to determine weight compliance.

Results: The cover weighed 58 pounds, the base weighed 65.5 pounds, total tare weight of 123.5 pounds. The results of this test are acceptable.

Leak Test

Test No. 2: The pneumatic pressure test was conducted in accordance with FED-STD-101, Method 5009.2 at 0.50 psig. The vacuum retention test was conducted in accordance with FED-STD-101, Method 5009.2 at 0.50 psig. The failure criteria for the test was 0.025 psig loss during a 30 minute period, after temperature and pressure stabilization.

Results: At the end of the 30 minute test period the pressure loss was 0.024 psig. At the end of the 30 minute test period the vacuum loss was 0.024 psig. The results of this test are acceptable.

Rough Handling Tests (+140^{o}F)

Test No. 3a: The high temperature cornerwise-drop (rotational) test was conducted in accordance with FED-STD-101, Method 5005.1. Due to the location of the center of gravity the maximum attainable height of the drop was 28 inches.

Results: Visual inspection revealed no external damage to the container. A maximum of 8 Gs was obtained during the test.

Test No. 3b: The high temperature edgewise-drop (rotational) test was conducted in accordance with FED-STD-101, Method 5008.1. Due to the location of the center of gravity the maximum attainable height of the drop was 28 inches.

Results: Visual inspection revealed no external damage to the container. A maximum of 10 Gs was obtained during the test.

Test No. 3c: The high temperature pendulum-impact test was conducted in accordance with FED-STD-101, Method 5012. The impact velocity was 7 ft/sec, the height of the drop was 9 inches.

Results: Visual inspection revealed no external damage to the container. A maximum of 17 Gs was obtained during the test.

The container was opened after the pendulum-impact test. Visual inspection revealed no damage to the container or the test load. The results of these tests are acceptable. See appendix 1 for detailed acceleration results.

Leak Test

Test No. 4: The pneumatic pressure test was conducted in accordance with FED-STD-101, Method 5009.2. The test was performed at 0.50 psig. The failure criteria for the test was a 0.0125 psig loss during a 15 minute period after temperature and pressure stabilization.

Results: At the end of the 15 minute test period the pressure loss was 0.01 psig. The result of this test is acceptable.

Rough Handling Tests ($-20^{o}F$)

Test No. 5a: The low temperature cornerwise-drop (rotational) test was conducted in accordance with FED-STD-101, Method 5005.1. Due to the location of the center of gravity the maximum attainable height of the drop was 24 inches.

Results: Visual inspection revealed no external damage to the container. A maximum of 11 Gs was obtained during the test.

Test No. 5b: The low temperature edgewise-drop (rotational) test was conducted in accordance with FED-STD-101, Method 5008.1. Due to the location of the center of gravity the maximum attainable height of the drop was 29 inches.

Results: Visual inspection revealed no external damage to the container. A maximum of 14 Gs was obtained during the test.

Test No. 5c: The low temperature pendulum-impact test was conducted in accordance with FED-STD-101, Method 5012. The impact velocity was 7 ft/sec, the height of the drop was 9 inches.

Results: Visual inspection revealed no external damage to the container. A maximum of 29 Gs was obtained during the test.

The container was opened after the pendulum-impact test. Visual inspection revealed no damage to the container or the test load. However after cold conditioning the decals fell off the container. The results of this test are acceptable.

Leak Test

Test No. 6: The pneumatic pressure test was conducted in accordance with FED-STD-101, Method 5009.2. The test was performed at 0.50 psig. The failure criteria for the test was a 0.0125 psig loss during a 15 minute period after temperature and pressure stabilization.

Results: At the end of the 15 minute test period the pressure loss was 0.01 psig. The result of this test is acceptable.

Vibration Fatigue Test

Test No. 7: The vibration fatigue test was conducted in accordance with MIL-STD-648, paragraph 5.3.2. The container was rigidly attached to the platform (see figure 4). A sinusoidal vibration excitation was applied in a vertical direction and cyclically swept for 7.5 minutes at 2 minutes per octave to locate the resonant frequency. Input from 5 to 12.5 Hz was at 0.125 inch double amplitude and input from 12.5 to 50.0 Hz was at 1.0 G. A 30 minute dwell test was conducted at the resonant frequency.

Results: Visual inspection revealed no damage to the container or the test load. A maximum of 2.7 Gs was obtained at the resonant frequency of 11.5 Hz. The maximum transmissibility obtained was 2.4. The results of this test are acceptable.

Leak Test

Test No. 8: The pneumatic pressure test was conducted in accordance with FED-STD-101, Method 5009.2. The test was performed at 0.50 psig. The failure criteria for the test was a 0.0125 psig loss during a 15 minute period after temperature and pressure stabilization.

Results: At the end of the 15 minute test period the pressure loss was 0.008 psig. The result of this test is acceptable.

Hoisting Strength Test

Test No. 9: The single ring hoisting test was conducted in accordance with MIL-STD-648, paragraph 5.8.5. The loaded container was lifted by a lift ring and suspended for five minutes.

Results: Visual inspection of the container revealed no damage or deformation. The result of this test is acceptable.

Cover Handle Pull Test

Test No. 10: The cover handle pull test was performed using one handle to lift the 58 pound cover off the ground. A 192 pound weight was placed on the cover to give a total weight of 250 pounds. The cover was suspended for 5 minutes.

Results: Visual inspection revealed no deflection or permanent deformation to the cover handle or the container cover. The results of this test are acceptable.

Leak Test

Test No. 11: The pneumatic pressure test was conducted in accordance with FED-STD-101, Method 5009.2. The test was performed at 0.50 psig. The failure criteria for the test was a 0.0125 psig loss during a 15 minute period after temperature and pressure stabilization.

Results: At the end of the 15 minute test period the pressure loss was 0.012 psig. The result of this test is acceptable.

Superimposed Load Test

Test No. 12a: The ambient superimposed load test was conducted in accordance with FED-STD-101, Method 5016.1. A load of 2909 pounds was placed on top of the container using load spreaders. This simulates the loading of a stack of five containers with a safety factor of two on the bottom container (see figure 5).

Results: Visual inspection revealed no damage to the container. The result of this test is acceptable.

Test No. 12b: The high temperature, high humidity superimposed load test was conducted in accordance with FED-STD-101, Method 5016.1. A load of 1455 pounds was placed on top of the container using load spreaders this simulates the loading of a stack of five containers with a safety factor of one on the bottom container (see figure 6).

Results: Visual inspection revealed a permanent deformation of the container (see figure 7). This deformation did not cause any damage to the R/T or impair stackability. The result of this test is acceptable.

Leak Test

Test No. 13: The pneumatic pressure test was conducted in accordance with FED-STD-101, Method 5009.2. The test was performed at 0.50 psig. The failure criteria for the test was a 0.0125 psig loss during a 15 minute period after temperature and pressure stabilization.

Results: The container would not pressurize and a leakage rate could not be obtained. This occurred due to the permanent deformation of the container from the high temperature, high humidity & superimposed load test.

Conclusion

The [illegible] prototype container provided adequate mechanical protection for the contents when tested in accordance with the container test plan. However, the container provides marginal environmental protection, especially if the container will be shipped and/or stored in a stacked configuration under tropical conditions.

RECOMMENDATIONS

Additional cushion cut outs around the pressure relief valve and humidity indicator. Decals on the containers need better adherence for cold temperature environments. Container walls need to be made stiffer for more stability. The container should not be used for lengthy storage.

AIR FORCE PACKAGING EVALUATION ACTIVITY

(Container Test Plan)

AFPEA PROJECT NUMBER: 88-P-102

CONTAINER SIZE (L x W x D)(INCHES) INTERIOR:	EXTERIOR:	WEIGHT (LBS) GROSS:	ITEM:	CUBE (CU. FT.)	QUANTITY	DATE
						3 Jul 89

ITEM NAME: LRUs

MANUFACTURER: Hardigg Industries

CONTAINER NAME:

CONTAINER COST:

PACK DESCRIPTION: Part numbers 11214-8678-100

CONDITIONING: Composite Container

As noted below.

TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION
1.	WEIGHT TEST	Container cover weight should not be greater than 60 lbs. Total container weight shall not be less than 123 lbs.	Fully assembled container including shock isolation system.	Scale
2.	LEAK TEST FED-STD-101 Method 5009.2	Pneumatic pressure at 0.50 PSIG and vacuum retention at 0.50 PSIG. Test duration to be a minimum of 30 minutes with 0.025 PSIG loss allowed after temperature stabilization.	Test at ambient condition from compressed air supply/vacuum pump.	Water manometer
3.	ROUGH HANDLING TESTS (HIGH TEMPERATURE +140°F)			
a.	FED-STD-101 Method 5008.1	Edgewise-drop (rotational) test. Condition at +140°F for not less than 24 hours. Drop height 36 inches or maximum height where container does not tilt over on side. Peak resultant acceleration shall not exceed 40Gs.	Test performed in chamber. One drop on two adjacent bottom edges, total of two drops.*	Tri-axial accelerometers

COMMENTS: * Remaining edge drops to be performed in Test No. 5a.

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APPROVED BY: Ted Hinds
Ted Hinds, Chief, Design Br., AFPEA

AIR FORCE PACKAGING EVALUATION ACTIVITY

(Container Test Plan)

AFPEA PROJECT NUMBER: 88-P-102

CONTAINER SIZE (L x W x D) (INCHES) INTERIOR:	EXTERIOR:	WEIGHT (LBS) GROSS:	ITEM:	CUBE (CU. FT.)	QUANTITY	DATE
						3 Jul 89

ITEM NAME: LRUs

MANUFACTURER: Hardigg Industries

CONTAINER NAME: Part numbers 11214-[illegible]

CONTAINER COST:

PACK DESCRIPTION: Composite container

CONDITIONING: As noted below.

TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION
	[illegible]	Cornerwise-drop (rotational) test. Condition at +140°F for not less than 24 hours. Drop height 36 inches or maximum height where container does not tilt over on side. Peak resultant acceleration shall not exceed 40Gs.	Test performed in chamber. One drop on diagonal bottom corners, total of two drops.*	Tri-axial accelerometers
	[illegible] 5012	Pendulum-impact test. Condition at +165°F. Temperature of shock mitigation system at time of test shall be +140 (+10,-0°F). Impact velocity [illegible] ft/sec, drop height [illegible] inches. Peak resultant acceleration shall not exceed 40Gs.	One impact on two adjacent sides, total of two impacts.**	Tri-axial accelerometers, Thermocouples
	FLAK TEST [illegible]-STD-[illegible] Method 5309.2	Pneumatic pressure with 0.50 PSIG. Test duration not less than 15 minutes with 0.0125 PSIG loss allowed after temperature stabilization.	Ambient	Water manometer

COMMENTS: * Remaining corner drops to be performed in Test No. 5b.
** Remaining side impacts to be performed in Test No. 5c.

PREPARED BY: Susan Hughey, Mechanical Engineer

APPROVED BY: Ted Hinds, Chief, Design Br., AFPEA

AIR FORCE PACKAGING EVALUATION ACTIVITY

(Container Test Plan)

AFPEA PROJECT NUMBER: 88-P-102

CONTAINER SIZE (L x W x D)(INCHES) INTERIOR:	EXTERIOR:	WEIGHT (LBS) GROSS:	ITEM:	CUBE (CU. FT.)	QUANTITY	DATE
						3 Jul 89

ITEM NAME: LRUs

MANUFACTURER: Hardigg Industries

CONTAINER NAME: Part numbers 11214-8678-100

CONTAINER COST:

PACK DESCRIPTION: Composite Container

CONDITIONING: As noted below.

TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRU-MENTATION
5.	ROUGH HANDLING TESTS (LOW TEMPERATURE -20°F)			
a.	FED-STD-101 Method 5008.1	Edgewise-drop (rotational) test. Condition at -20°F for not less than 24 hours. Drop height 36 inches or maximum height where container does not tilt over. Peak resultant acceleration shall not exceed 40Gs.	Test performed in chamber. One drop on two adjacent bottom edges, total of two drops.*	Tri-axial accelero-meters
b.	FED-STD-101 Method 5005.1	Cornerwise-drop (rotational) test. Condition at -20°F for not less than 24 hours. Drop height 36 inches or maximum height where container does not tilt over. Peak resultant acceleration shall not exceed 40Gs.	Test performed in chamber. One drop on diagonal bottom corners, total of two drops.**	Tri-axial accelero-meters
c.	FED-STD-101 Method 5012	Pendulum-impact test. Condition at -65°F. Temperature of shock mitigation system at time of test shall be -20 (+0,-10°F). Impact velocity 7 ft/sec, drop height 9 inches. Peak	One impact on two adjacent sides, total of two impacts.***	Tri-axial accelero-meters, Thermo-couples

COMMENTS:
* These edges are opposite those impacted in Test No. 3a.
** These corners are opposite those impacted in Test No. 3b.
*** These sides are opposite those impacted in Test No. 3c.

PREPARED BY: Susan Hughey, Mechanical Engineer

APPROVED BY: Ted Hinds, Chief, Design Br., AFPEA

AIR FORCE PACKAGING EVALUATION ACTIVITY

(Container Test Plan)

AFPEA PROJECT NUMBER: 88-P-102

CONTAINER SIZE (L x W x D)(INCHES) INTERIOR:	EXTERIOR:	WEIGHT (LBS) GROSS:	ITEM:	CUBE (CU. FT.)	QUANTITY	DATE
						3 Jul 89

ITEM NAME: LRUs

MANUFACTURER: Hardigg Industries

CONTAINER NAME: Part numbers 11214-8678-100

CONTAINER COST:

PACK DESCRIPTION: Composite Container

CONDITIONING: As noted below.

TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION
		resultant acceleration shall not exceed 40Gs.		
6.	LEAK TEST TED-STD-101 Method 5009.2	Pneumatic pressure with 0.50 PSIG. Test duration not less than 15 minutes with 0.0125 PSIG loss allowed after temperature stabilization.	Ambient	Water manometer
7.	VIBRATION FATIGUE TEST MIL-STD-648 Para 5.3.2	Input excitation of 0.125 inch double amplitude or 1G, whichever is less. Sweep approximately logarithmically from 5 to 50 Hz (about 1/2 octave/min) for 7-1/2 minutes. Then dwell 30 minutes at the resonant frequency. The test may be interrupted to prevent excessive temperature rise in materials. Transmissibility shall not exceed 5 at the resonant frequency.	Rigidly attach container to exciter. The use of straps is prohibited.	Triaxial accelerometers, Thermocouples

COMMENTS:

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APPROVED BY: Ted Hinds, Chief, Design Br., AFPEA

AIR FORCE PACKAGING EVALUATION ACTIVITY

(Container Test Plan)

AFPEA PROJECT NUMBER: 88-P-102

CONTAINER SIZE (L x W x D)(INCHES) INTERIOR:	EXTERIOR:	WEIGHT (LBS) GROSS:	ITEM:	CUBE (CU. FT.)	QUANTITY	DATE
						3 Jul 89

ITEM NAME: LRUs

MANUFACTURER: Hardigg Industries

CONTAINER NAME: Part numbers 11214-8678-100

CONTAINER COST:

PACK DESCRIPTION: Composite Container

CONDITIONING: As noted below.

TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRU-MENTATION
8.	LEAK TEST FED-STD-101 Method 5009.2	Pneumatic pressure with 0.50 PSIG. Test duration not less than 15 minutes with 0.0125 PSIG loss allowed after temperature stabilization.	Ambient	Water manometer
9.	HOISTING STRENGTH TEST MIL-STD-648 Para. 5.8.5	Single ring hoisting test. Hoist container at one lift point and leave hanging for five minutes. There shall be no damage or permanent deformation.	Ambient	Visual inspection
10.	COVER HANDLE PULL TEST	Apply a force of 250 lbs on a cover handle in all directions that service loads are possible. There shall be no damage or permanent deformation.	Ambient	Scale

COMMENTS:

PREPARED BY: Susan Hughey, Mechanical Engineer

APPROVED BY: Ted Hinds, Chief, Design Br., AFPEA

AIR FORCE PACKAGING EVALUATION ACTIVITY

(Container Test Plan)

AFPEA PROJECT NUMBER: 88-P-102

CONTAINER SIZE (L x W x D)(INCHES) INTERIOR:	EXTERIOR:	WEIGHT (LBS) GROSS:	ITEM:	CUBE (CU. FT.)	QUANTITY	DATE
						3 Jul 89

ITEM NAME: LRUs

MANUFACTURER: Hardigg Industries

CONTAINER NAME: Part numbers 11214-8678-100

CONTAINER COST:

PACK DESCRIPTION: Composite Container

CONDITIONING: As noted below.

TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRU-MENTATION
11.	LEAK TEST FED-STD-101 Method 5009.2	Pneumatic pressure with 0.50 PSIG. Test duration not less than 15 minutes with 0.0125 PSIG loss allowed after temperature stabilization.	Ambient	Water manometer
12.	SUPERIMPOSED LOAD FED-STD-101 Method 5016.1	At ambient temperature, stack two containers with additional load on top to simulate stacking 5 containers or 16 ft high, whichever is greater. Load equals load on bottom container times a factor of safety of 2. Test duration not less than 1 hour. Additional load placed on top container such that the total load is carried by the stacking provisions. There shall be no permanent deformation. The test shall be repeated with containers conditioned at 120°F and	Test conducted at ambient and +120°F (in chamber). Stack two high, bottom container is under test.	Visual inspection

COMMENTS:

PREPARED BY: Susan Hughey, Mechanical Engineer

APPROVED BY: Ted Hinds, Chief, Design Br., AFPEA

AIR FORCE PACKAGING EVALUATION ACTIVITY

(Container Test Plan)

AFPEA PROJECT NUMBER: 88-P-102

CONTAINER SIZE (L x W x D)(INCHES) INTERIOR:	EXTERIOR:	WEIGHT (LBS) GROSS:	ITEM:	CUBE (CU. FT.)	QUANTITY	DATE
						3 Jul 89

ITEM NAME: LRUs

MANUFACTURER: Hardigg Industries

CONTAINER NAME: Part numbers 11214-8678-100

CONTAINER COST:

PACK DESCRIPTION: Composite Container

CONDITIONING: As noted below.

TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRU-MENTATION
		90% relative humidity for 168 hours. The safety factor shall be 1.		
13.	LEAK TEST FED-STD-101 Method 5009.2	Pneumatic pressure with 0.50 PSIG. Test duration not less than 15 minutes with 0.0125 PSIG loss allowed after temperature stabilization.	Ambient	Water Manometer

COMMENTS:

PREPARED BY: Susan Hughey, Mechanical Engineer

APPROVED BY: Ted Hinds, Chief, Design Br., AFPEA

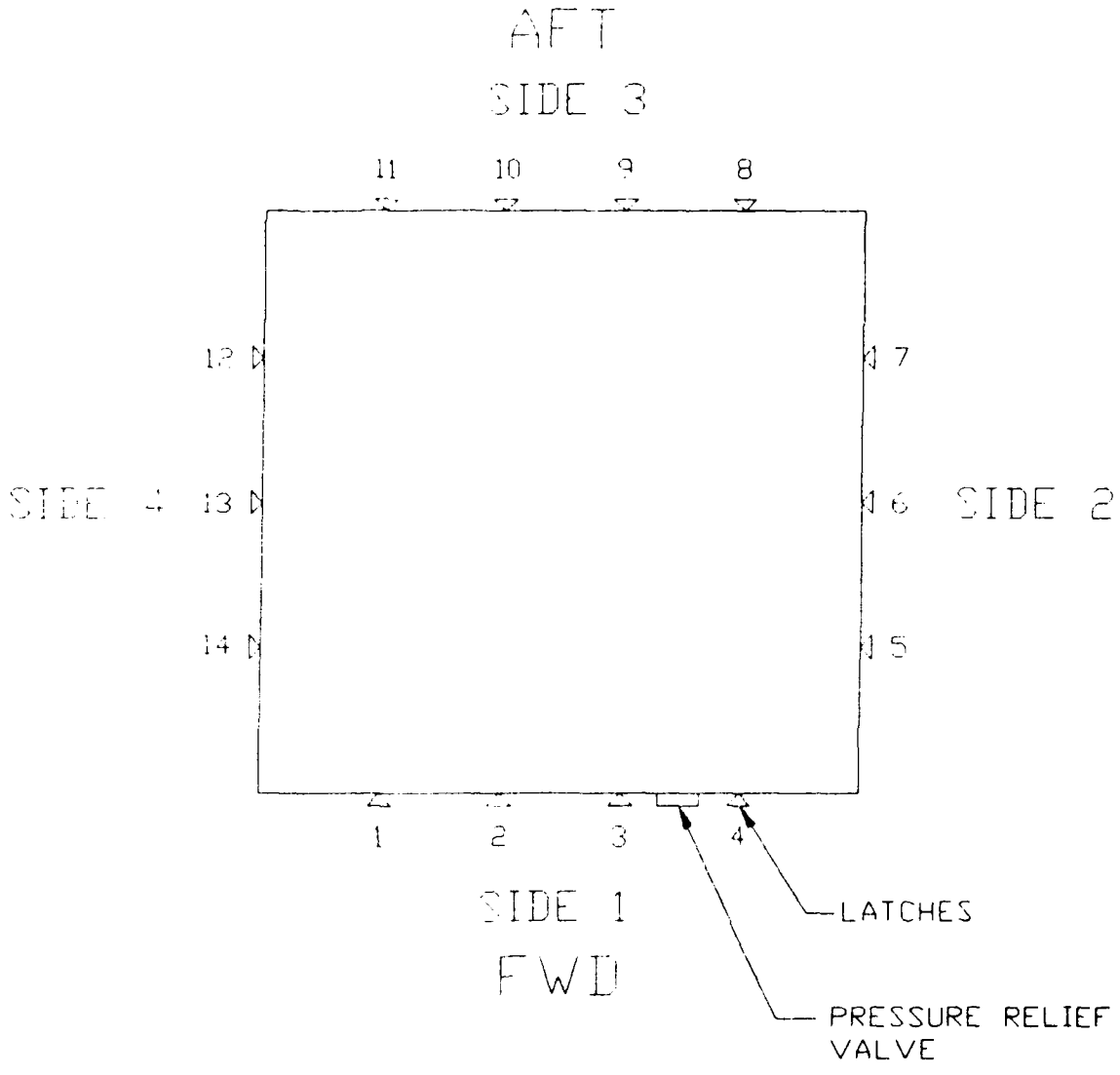

FIGURE 1. -100 Corner, Side and Latch Numbering

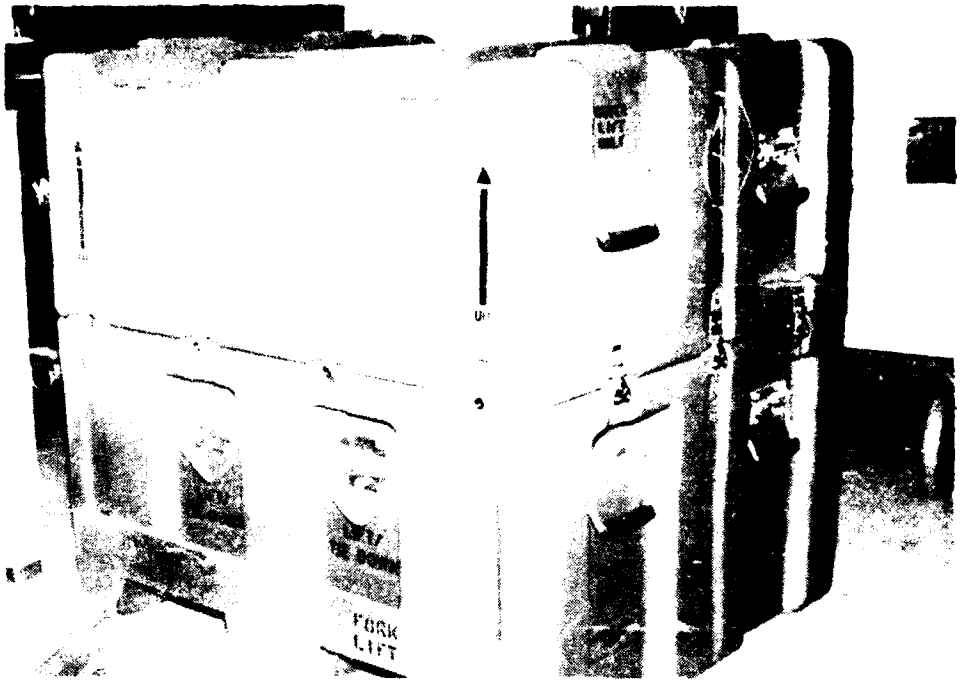

Figure 2

-100
Prototype
Container.

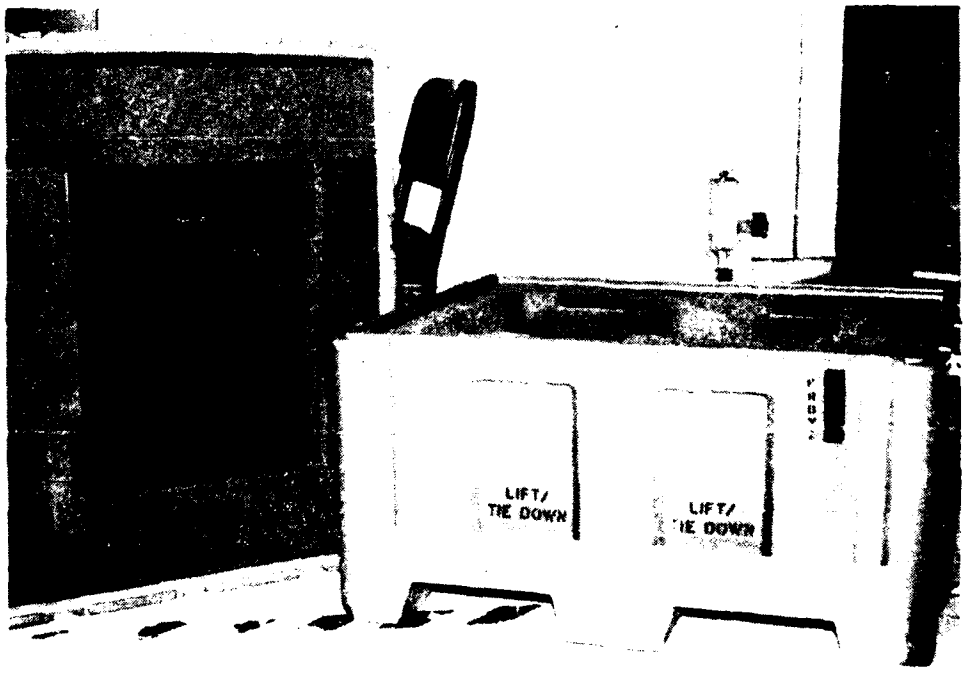

Figure 3

-100
Container
Cushioning.

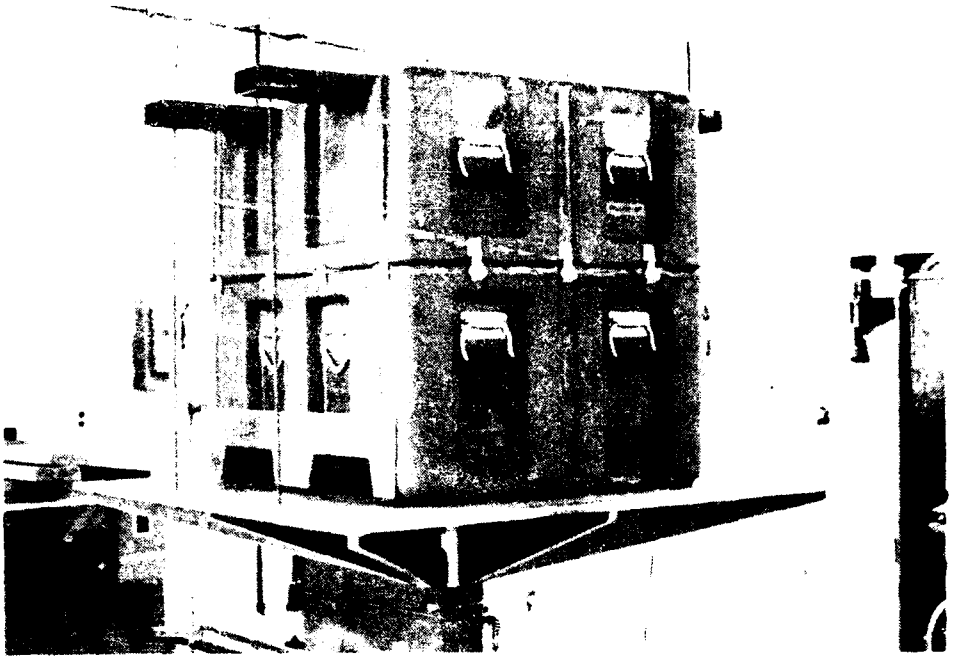

Figure 4

Vibration
Fatigue Test.

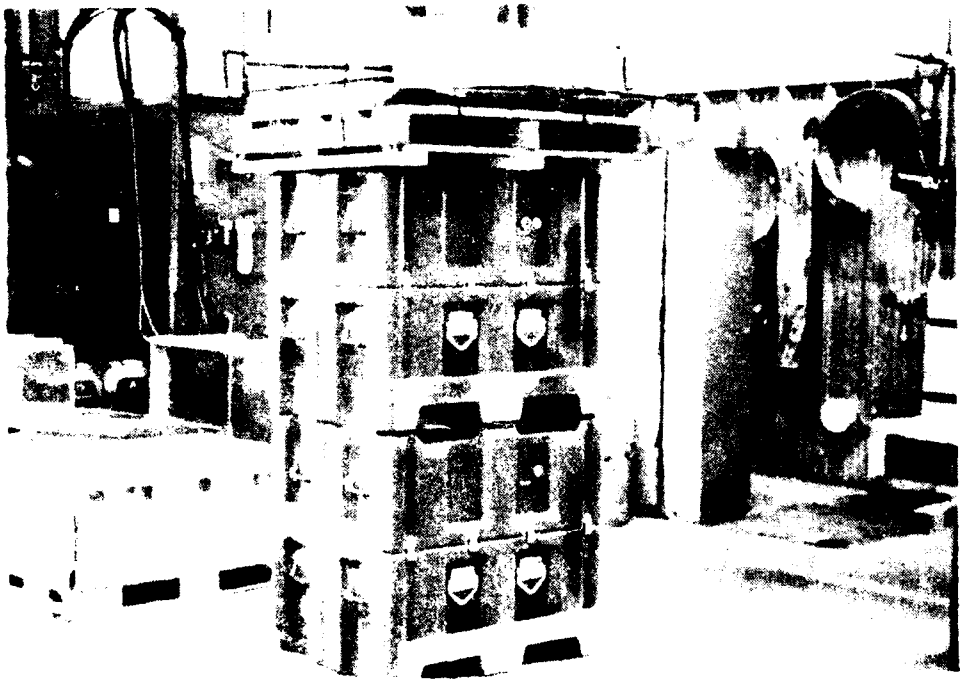

Figure 5

Ambient
Superimposed
Load Test.

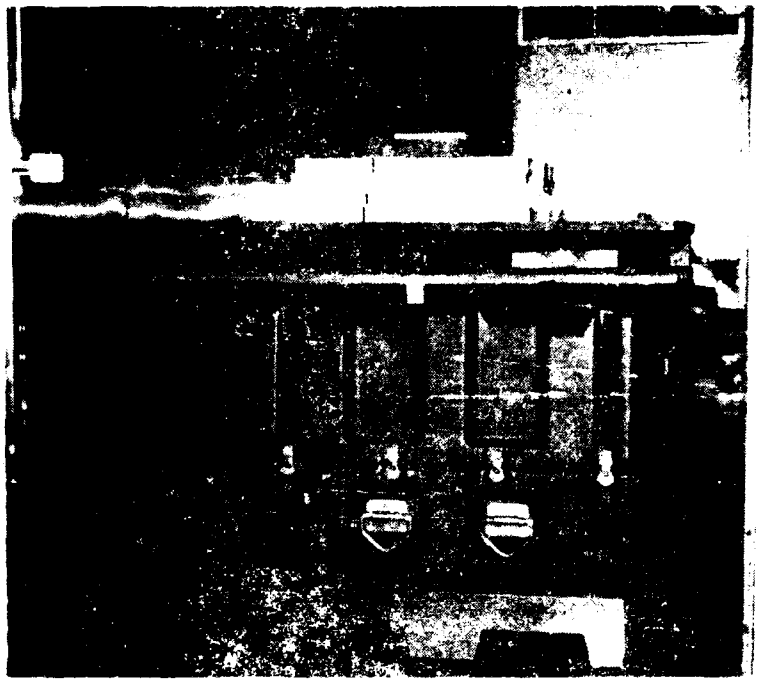

Figure 6

High Temperature, High Humidity Superimposed Load Test.

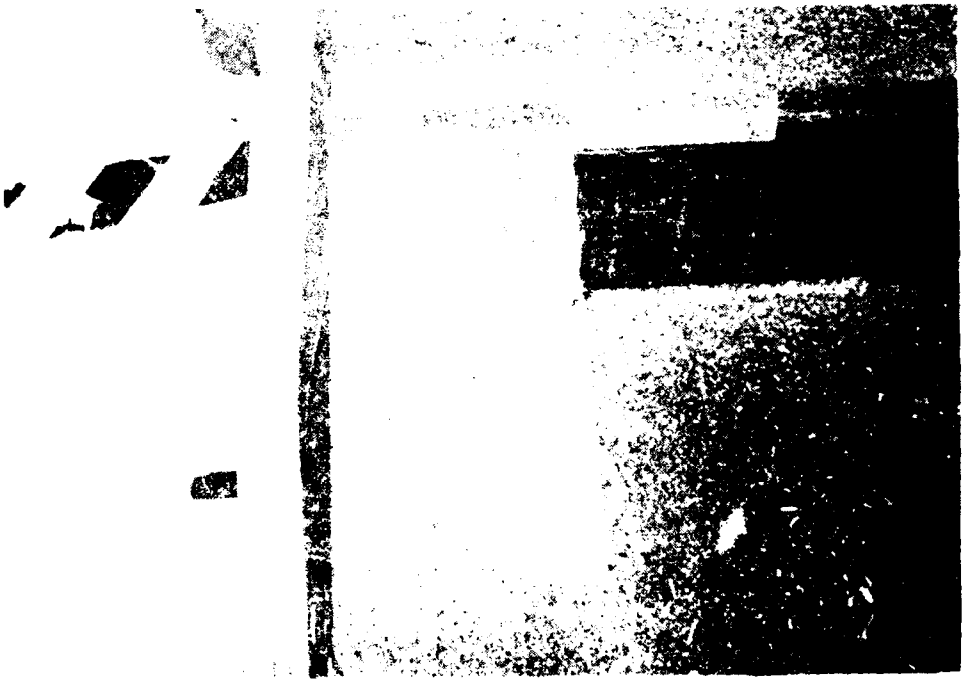

Figure 7

-100 Container Deformation.

DISTRIBUTION LIST

DTIC/FDAC Cameron Station Alexandria, VA 22304-6145	2
HQ AFLC/DSTZ Library Wright-Patterson AFB OH 45433-5999	10
HQ USAF/LETT Washington DC 20330	1
HQ AFSC/LGT Andrews AFB DC 20334-5000	1
OC-ALC/DSTP Tinker AFB OK 73145	1
OO-ALC/DSTP Hill AFB UT 84406	1
SA-ALC/DSTP Kelly AFB TX 78241	1
SM-ALC/DSTP McClellan AFB CA 95652	1
WR-ALC/DSTP Robins AFB GA 31098	1
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Commanding Officer 1
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-100 CONTAINER - DETAILED ACCELERATION RESULTS

HIGH TEMPERATURE ROUGH HANDLING TESTS (+140°F)

Impact	Position	Accelerometer readings (Gs) Resultant
28" rotational drop	Corner 1-2	7
28" rotational drop	Corner 3-4	8
25" rotational drop	Side 3	10
28" rotational drop	Side 4	6
7 ft/sec pendulum-impact	Side 1	14
7 ft/sec pendulum-impact	Side 2	17

1. No damage to the container or the test load.

LOW TEMPERATURE ROUGH HANDLING TESTS (-20°F)

Impact	Position	Accelerometer readings (Gs) Resultant
28" rotational drop	Corner 1-4	8
24" rotational drop	Corner 2-3	11
24" rotational drop	Side 1	8
29" rotational drop	Side 2	14
7 ft/sec pendulum-impact	Side 3	24
7 ft/sec pendulum-impact	Side 4	29

1. No damage to the container or the test load.

VIBRATION FATIGUE TEST

Natural frequency 11.5 Hz
(input: 1.04 G peak, 0.125 inch double amplitude)

	Resultant
Maximum Acceleration (Gs, peak to peak)	2.7
Maximum Transmissibility	2.4

1. No damage to the container or the test load.